

PAUL V. TAUFALLELE, PhD

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MAJOR RESEARCH EXPERIENCE

Graduate Research Assistant

2017-2024

Biomedical Engineering Department, Vanderbilt University

Advisor: Cynthia A. Reinhart-King, Ph.D.

- Optimized sample preparation and data analysis for bulk and single cell RNA sequencing experiments identifying key molecular drivers of mechanical and behavioral heterogeneity in the tumor microenvironment
- Fostered collaboration through training fellow researchers on bulk and single cell RNA sequencing methodologies
- Proven track record of productivity with authorship on 14 publications (4 first-author) with 4 additional publications in progress (2 first-author)
- Demonstrated strong leadership and mentorship abilities guiding 2 master's students and 1 research assistant to successful project completions, as well as supervising 3 undergraduates

Research Consultant

2024

Finally Skincare – Mass spectroscopy based molecular analysis tool for robust skincare

- Provided mass spectroscopy data analysis and data science support with projects utilizing HTML/CSS, Python, Javascript, SQL, and AWS

Research Consultant

2020

OmniLife - Integrated communication and clinical workflow management

- Implemented several organ transplant compatibility tools via ReactJS in a web application to be utilized in a clinical trial testing the impact of predictive tools on clinical decision making

Undergraduate Research Assistant

2013-2017

Fraternal Order of Eagles Diabetes Research Center, University of Iowa

Advisor: E. Dale Abel M.D., Ph.D.

- Studied underlying mechanism to cardiac dysfunction induced by mitochondrial pyruvate carrier 1 (MPC1) deficiency within the heart using transgenic mouse models and biochemistry assays resulting in 1 published manuscript and 3 conference presentations

EDUCATION

2024 **Ph.D.** **Vanderbilt University**, Nashville, TN
Biomedical Engineering
Advisor: Cynthia A. Reinhart-King, Ph.D.

2017 **B.S.E.** **University of Iowa**, Iowa City, IA
Biomedical Engineering, University Honors, & Chemistry Minor
Specialization in Cellular Engineering

TECHNICAL SKILLS

PROGRAMMING/SOFTWARE: Unix, Git, R, Python, Matlab, ImageJ, GraphPad Prism, Bioconductor, SLURM

BIOINFORMATICS: Bulk/Single cell RNA sequencing (NGS & Indrops/10X)

MOLECULAR BIOLOGY: primer design, PCR, RT-PCR, qPCR, restriction digestion, Gibson assembly, ligation, transformation, transfection, lentivirus production, transduction

CELL BIOLOGY: mammalian cell culture, tumor endothelial cell isolation, immunofluorescence, immunohistochemistry, polyacrylamide gel synthesis, DNA, RNA, and protein isolation, Western blot, ELISA

IN VITRO ASSAYS: endothelial spheroid models, endothelial monolayer assays, endothelial network formation assays, collagen compaction, proliferation assays (EdU), mechanical testing, collagen alignment, migration assays

MICROSCOPY: Confocal microscopy, fluorescence microscopy, polarized light microscopy, traction force microscopy, confocal reflectance, time-lapse, fluorescence recovery after photobleaching (FRAP), brightfield

MOUSE MODELS: i.p. and s.c. injections, retro-orbital blood collection, mouse dissection and tissue collection, mouse exercise training, glucose/insulin tolerance testing

SELECTED HONORS

2020 – Recipient – NIH F31 Ruth L. Kirschstein Predoctoral Individual National Research Fellowship

2020 – Honorable Mention – Ford Foundation Predoctoral Fellowship

2019 – BMES Student Design and Research Award

2018 – NIH R01 Diversity Supplement Award

2017 – Most Technically Interesting by Equifax – ArchHacks

2016 – Best Smart Application for a Smart Device – Hack ISU

SyBBURE Searle Graduate Fellow

2020 – present

SyBBURE Searle Undergraduate Research Program, Vanderbilt University

- Led professional development seminars on RNA sequencing methodologies over the summer semesters
- Mentored science and engineering undergraduates (~50 student cohorts) on a weekly basis for each semester
- Led a subgroup (4-5 students) on a weekly basis to provide research and professional advice
- Managed a small team (4-5 students) working on innovative projects where I provided oversight on generating project roadmaps, creating minimum viable projects, learning new skills, and connecting with proper resources

Co-founder – Iowa International Genetically Engineered Machines (IGEM) Team

2017

University of Iowa

Advisors: Jan Fassler Ph.D., Edward Sander Ph.D., Craig Ellermier Ph.D.

- Organized a team of 11 undergraduates and 3 faculty advisors, led a crowd-source funding operation to raise \$8000 for reagents and registration, and researched previous literature
- Generated 3 novel DNA constructs and awarded a bronze medal for our scientific contribution and our unique outreach that included hosting a weekly radio show ‘Science at Five’

Scholar - Iowa Biosciences Academy

2016-2017

Iowa Biosciences Academy, University of Iowa

- Led monthly professional seminars and workshops for undergraduates from underrepresented groups looking to transition to a graduate research program

SELECTED PUBLICATIONS (7 OUT OF 15)

PEER-REVIEWED JOURNAL PUBLICATIONS

* *Authors contributed equally*

1. **Taufalele, P.V.***, Wang, W.*, ... & Reinhart-King, C.A. (2023). Matrix stiffness enhances cancer-macrophage interactions and M2-like macrophage accumulation in the breast tumor microenvironment. *Acta Biomaterialia*.
2. Schwager, S.C., Mosier, J.A., Padmanabhan, R.S., White, A., Xing, Q., Hapach, L.A., **Taufalele, P.V.**, ... & Reinhart-King, C.A. (2022). Link between glucose metabolism and EMT drives triple negative breast cancer migratory heterogeneity. *iScience*, 105190.
3. **Taufalele, P.V.**, & Reinhart-King, C.A. (2021). Matrix stiffness primes cells for future oxidative stress. *Trends in Cancer*, 7(10), 883-885.
4. Hapach, L.A., Carey, S.P., Schwager, S.C., **Taufalele, P.V.**, ... & Reinhart-King, C.A. (2020). Phenotypic heterogeneity and metastasis of breast cancer cells. *Cancer Research*, 81(13), 3649-3663
5. Zhang, Y., **Taufalele, P.V.**, Cochran, J.D., Frayne, I.B., Soto, J., Funari, T.P., ... & Abel, E.D. (2020). Mitochondrial pyruvate carriers are required for myocardial stress adaptation. *Nature Metabolism*, 2 (12), 1498
6. **Taufalele, P.V.**, VanderBurgh, J.A., Munoz, A., Zanutelli, M.R., Reinhart-King, C.A. (2019). Fiber alignment drives changes in architectural and mechanical features in collagen matrices. *PLoS one*, 14(5), e0216537.
7. Schwager, S.C.*, **Taufalele, P.V.***, Reinhart-King, C.A. (2018). Cell-cell mechanical communication in cancer. *Cellular and Molecular Bioengineering*, 12(1), 1-14.

SELECTED PRESENTATIONS (3 OUT OF 17)

1. **Taufalele, P.V.**, ... & Reinhart-King, C.A. (2022) Matrix stiffness mediates DNA methylation in endothelial cells. Poster presentation at the BMES Annual Meeting, San Antonio, TX
2. **Taufalele, P.V.**, ... & Reinhart-King, C.A. (2021) The phenotypic distribution of tumor associated macrophages is altered by matrix stiffness. Oral presentation at the BMES Annual Meeting, Orlando FL.
3. **Taufalele, P.V.**, ... & Reinhart-King, C. A. (2019) Investigating the effects of tumor stiffness on intratumoral heterogeneity. Oral presentation at the BMES Annual Meeting, Philadelphia, PA.